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Financial Control Policies of General Motors Corporation and Their Relationship to Cost Accounting

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Editorial Department Note

This paper is, in our opinion, a significant contribution to the literature dealing with accounting in its relations to financial management. It is a generally accepted dictum that unit cost of product decreases with volume of output. A necessary corollary is that selling price may therefore be cut without affecting the sum total of net profits. Starting with the idea that an industry should over a period of time earn a fair return on the capital investment, and with a standard volume of output, the author arrives at a selling price of product which will secure the fair economic return desired. Furthermore, he examines the problem as to what increase in volume of sales will be necessary to offset a given contemplated reduction in selling price, and the related problem as to what decrease in sales volume can be permitted without a further reduction of profit than would accrue from a cut in sales price resulting in a bare maintenance of former volume.

These are questions involving an examinaton of the whole fabric of cost accounting and a side excursion into the question as to the relation of interest on investment to costs and price policies. Treating, as the publication does, of the policies of one of the most romantic industries of modern times, it will receive a very careful reading by our membership.

The author, Albert Bradley, served for two years as works accountant for public utilities operated by the Stone and Webster Management Association after which he entered Dartmouth College in 1911 and was granuated a Bachelor of Science in 1915. He pursued graduate studies in the University of Michigan, where he received the degrees of Master of Arts, 1916, and Doctor of Philosophy in 1917, specializing in economics and finance. From 1917 to 1918, he was in the Air Service of the U. S. Army, during the first year specializing on distribution of overhead as applied to cost plus contracts. While in the Air Service of the Army, he became District Accounting Officer, Dayton District, and later District Accounting Officer, Detroit District.

He joined Comptroller's staff of General Motors Corporation in May, 1919, and was made Assistant Treasurer of the Corporation later in that year.

Mr. Bradley is a member of the Executive Committee of the American Management Association and has been actively interested in the financial aspects of management problems.

This paper was delivered before a recent meeting of the Detroit Chapter National Association of Cost Accountants.

FINANCIAL CONTROL POLICIES OF GENERAL MOTORS CORPORATION AND THEIR RELATIONSHIP TO COST ACCOUNTING

Introduction

General Motors Is Primarily an Operating Concern. Before outlining the relationship to cost accounting of the financial control policies of General Motors, a few facts regarding this corporation

may be of interest. General Motors is now primarily an operating concern engaged in the manufacture and sale of automobiles, their accessories and parts, and owning the plants, properties and other assets of its manufacturing operations, which are known as Divisions. Besides the Buick, Cadillac, Chevrolet, Oakland, Oldsmobile, and Pontiac passenger and commercial cars, the principal products of General Motors are accessories, parts and automobile bodies, which the accessory divisions sell not only to the car divisions of the General Motors family, but also to outside automotive and industrial concerns. A subsidiary of large and growing importance is the Delco-Light Company, makers of the Frigidaire Line of electric refrigerators for household and commercial use, and the world's leading manufacturer in this field. Through stock ownership General Motors owns a controlling interest in the Yellow Truck and Coach Manufacturing Company, and a number of other subsidiaries.

The products of the car divisions are marketed through some 20,000 dealers scattered all over the world, less than 4% of the total volume being sold at retail by the Corporation. The growth of General Motors has paralleled that of the automobile industry. In 1909, the Corporation produced and sold 25,000 cars, their sales value being $29,029,000. Within six years, that is, in 1915, sales had increased to 76,068 cars and trucks, valued at $94,424,000. In 1925, there were sold 835,902 cars and trucks, and net outside sales of the Corporation had reached a figure of $734,592,000, or eight times the volume at the end of the previous decade. For the nine months ended September 30, 1926, net outside sales were $830,000,000, or at the annual rate of over $1,100,000,000. The number of cars and trucks sold during this period was 996,321, or an indicated annual rate of over 1,300,000 vehicles. Total assets employed by the Corporation have increased from $18,381,000, at the end of 1909, to $915,000,000 at September 30, 1926. In short, total assets of General Motors Corporation are now approaching a billion dollars, and annual sales are running in excess of a billion dollars.

General Motors a Decentralized Organization. General Motors Corporation is operated as a decentralized organization. Each operating Division or Subsidiary is in principle entirely self-contained and is responsible for the successful design, manufacture, and sale of its product, subject to the general policies of the Corporation.

In order to co-ordinate the efforts of the various Divisions, and particularly to make available to each Division the experience of all members of the family, there are various inter-divisional relations committees which come together at frequent intervals. The names of these committees suggest their respective spheres. They are the General Technical, General Sales, General Purchasing, Operations, and Works Managers Committees. The members of these committees are the important executives from representative divisions, supplemented in certain instances by talent from the central organization. Thus it is seen that General Motors Corpora-

tion operates on the decentralized plan. Its fundamental policies are enunciated by the Executive and Finance Committees, and coordination is effected by the President and through the medium of inter-divisional relations committees.

The ideal of the Corporation is centralization of policy but decentralization of management, which means that the president of each of the constituent companies is allowed an altogether free hand in his company. He is expected to carry out the general policies of the Corporation, but the methods by which he does this are as personal to himself and as free from interference as if he were the head of an independent corporation. This freedom of action of the part of managers is believed necessary in order to retain men of the calibre required. By this plan, the Corporation obtains all the advantages of personal, independent management—its initiative, its ability quickly to adapt its methods to changing conditions, and its close personal contact with its working force. By this means, also, are avoided many of the difficulties that arise when the size of a corporation becomes so great that no one man can possibly be wise enough, or wide-visioned enough, or have time enough really to be effective as its chief executive.

Financial Control Policies Serve Two General Purposes. Financial control policies of General Motors Corporation serve two general purposes: (1) The pricing of the product in a manner consistent with the fundamental policies of the Corporation as to return on investment; and (2) The maintenance of effective operating control through manufacturing schedules which are at all times in logical relationship to consumer demand. This requires not only the best possible estimates of the future volume of business, but also the maintenance of a healthy position in regard to: (a) Inventories carried by the Corporation and its dealers; and (b) Purchase commitments for materials made by the Corporation with its suppliers. The tool by means of which these policies are made effective is a comprehensive scheme of forecasting, combined with a systematic comparison of actual results with the forecast.

Financial Control Policies Made Effective Through Forecasting. The forecasting program of General Motors Corporation is nothing more than systematic planning applied to the conduct of its business, from the point of view of fundamental financial policies and of current operating control.

Systematic planning for the future, then, is the subject of this paper, with particular reference to the financial and economic aspects of the business, and their relationship, both direct and indirect, to the problems of the cost accountant.

Cost of Product

Let us first treat with certain broad aspects of the perennial problem of costs. It is, of course, axiomatic that the price of a product must reimburse the manufacturer not only for his direct outlays for labor and materials, but also for a proper portion of those costs which cannot be assigned directly to any particu-

lar unit or even class of product. As applied to the factory, these indirect expenses are usually referred to as "burden" or "overhead"; and as applied to the general administrative and sales organization, may be referred to as "commercial expense."

Factory Cost. The three elements of factory cost are usually referred to as: (1) Productive Labor—labor expended directly on the product—(2) Productive Materials—materials which enter into the composition of the final product—and, (3) Manufacturing Expense or Burden, consisting of so-called indirect labor—foremen, inspectors, material handling, etc.—indirect material, taxes, plant maintenance, light, heat and power, etc.

A correct accounting for productive labor and productive materials for many years has been the particular concern of the cost accountant, and the importance of this work as an aid to efficient operating management and in the control of inventories is well recognized. It is with certain aspects of indirect costs with which this paper is principally concerned.

Manufacturing Ratios. For the typical automobile manufacturing plant, as opposed to an assembly plant, a fair segregation of factory cost into its three constituent elements is as follows:

1.	Direct Materials.....	70%
2.	Productive Labor	10
3.	Burden or Overhead.....	20
	Total	100%

Manufacturing Expense. The general tendency is for manufacturing expense or burden to constitute an increasing portion of total factory cost. As industries develop, machine processes also develop, and the tendency is to substitute machine operations for hand operations. There results a decrease in total cost which may be caused by a decrease in labor cost per unit, which more than offsets the increase in burden cost per unit; or both labor and burden per unit may decrease. But in any event, the *percentage* which burden constitutes of total factory cost tends to increase.

Distribution of Overhead—Burden Center. It is, therefore, evident that factory burden or overhead as an element of factory cost is relatively more important than productive labor. Since the typical manufacturing establishment produces a variety of products, some of which involve a much greater relative use of machinery and other fixed investment in proportion to productive labor, than others, and likewise are responsible for a larger portion of indirect costs such as depreciation, power, etc., cost accountants have for a number of years been actively engaged upon an analysis of factory conditions with a view to the development of methods for the logical apportionment of "burden" to the several classes of product. In the words of Hamilton Church written a score of years ago, "every dollar of charges must be burdened onto some item of work." The same writer outlined his views as to the method of analysis, in his admonition not to regard the

shop as an organic whole, but rather to regard it as a collection of small "production centres," each differing from the other. By giving the fullest play to differences in responsibility for expense, instead of averaging conditions, cost finding has become much more scientific. For example, a typical manufacturing plant may have an over-all burden rate of 200 percent of productive labor, but this plant may consist of: Department A, with a preponderance of heavy machinery, with a burden rate of 300 percent of productive labor; Department B, with relatively little machinery, with a burden rate of only 100 per cent of productive labor; and Department C, with a condition somewhat between the other two, with a burden rate of say 180 percent. Manifestly, if different products are made in these different departments, the application of an average burden rate for the entire plant in the calculation of costs will result in costs for products of Department A which are much too low, and of Department B, which are altogether too high. That industry is now keenly alive to the importance of burden distribution is evidenced by the large output, during the last few years, of books and magazine articles dealing with this subject.

Variance in Costs With Fluctuations in Volume. It may fairly be said that there is little or no lack of appreciation on the part of cost accountants of the importance of correctly accounting for direct labor and direct materials. The basic principles underlying the burden center idea are well understood, and perhaps a majority of industrial concerns now apply a series of burden rates rather than a general average rate in order more accurately to compute their costs. There is, of course, much difference of opinion as to the extent to which refinement in method of allocation and apportionment of expense shall be carried; and the cost accountant at all times must guard against advocating the compilation of such a mass of data that there would be required to man the cost department a personnel larger than that engaged in productive operations in the shop. With these matters of improved technique it is believed you cost accountants may safely be entrusted, and I will pass on to certain phases of the problem of variances in costs with changes in rate of operations which do not appear to have been given the recognition they deserve.

Costs of production and distribution per unit of product vary with fluctuation in volume, because of the fixed or non-variable nature of some of the expense items. Productive materials and productive labor may be considered costs which are 100 percent variable, since within reasonable limits the aggregate varies directly with volume, and the cost per unit of product therefore remains uniform.

Among the items which are classified as manufacturing expense or burden, there exist varying degrees of fluctuation with volume, owing to their greater or lesser degree of variability. Among the absolutely fixed items are such expenses as depreciation, taxes, etc., which may be referred to as 100 percent fixed, since within the limits of plant capacity the aggregate will not

change, but the amount per unit of product will vary in inverse ratio to the output.

There is another group of items which may be classified as 100 percent variable, such as inspection, material handling, etc., the amount of which per unit of product is unaffected by volume. Between the classes of 100 percent fixed and 100 percent variable there is a large group of expense items which are partially variable, such as light, heat, power, salaries, etc. Lacking an exact means of determining the degree of variation, a practicable method is to approximate the condition by applying a variability factor calculated on the basis of past experience. To illustrate:

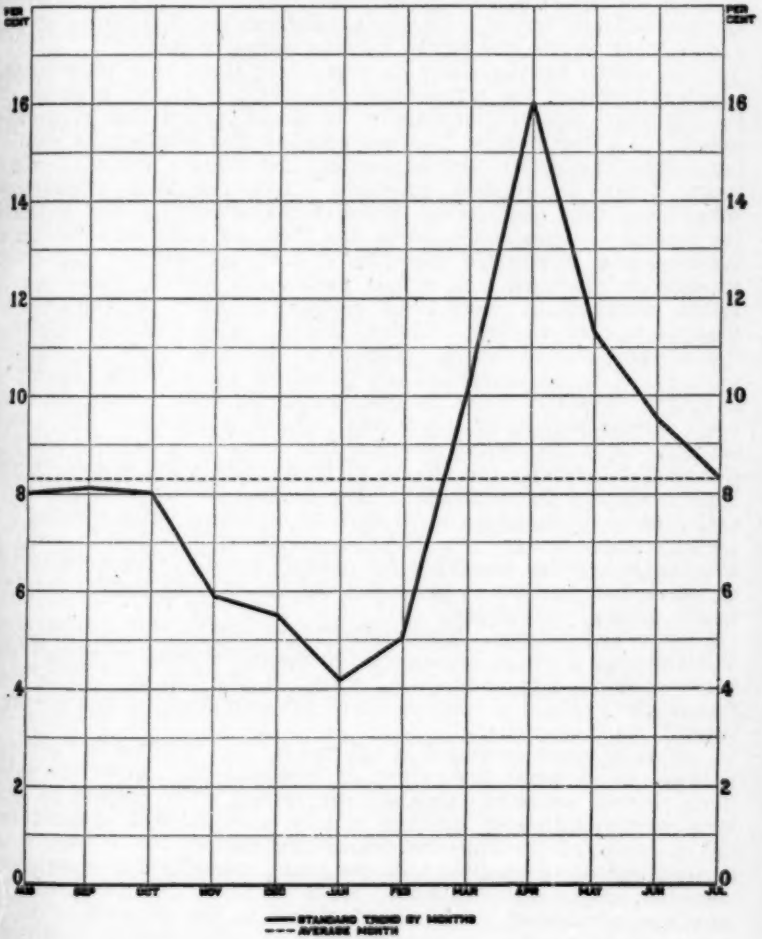
Standard Burden Rate. If the direct labor payroll is $100,000 for the accounting period, total manufacturing expense may aggregate $200,000, or 200 percent of direct labor. If the direct labor should amount to $150,000, manufacturing expense might increase to $275,000, or 133-1/3 percent of productive labor. On the other hand, if operations should decline to a point where productive labor is only $50,000, with proper control we should expect total manufacturing expense to decline to something like $125,000, or 250 percent of productive labor. Assuming that expenses have been properly controlled, the amount of non-variable expense indicated by these figures is $50,000, calculated as follows:

	Standard Volume	Above Standard	Below Standard
Various Volumes of Business under Observation, Prod. Labor....	$100,000	$150,000	$ 50,000
% of Standard Volume..	100%	150%	50%
Aggregate Mfg. Expense	$200,000	$275,000	$125,000
If the Expenses Were Directly Proportionate to Volume, the Aggregate at the Indicated Volumes would be...	$200,000	$300,000	$100,000
The Difference Reflects the Non - Controllable Character of the Expenses		$ 25,000	$ 25,000
If this Difference be Divided by the Percentage Variance from Standard Volume, which is		50%	50%
The Amount of Non-Controllable Expense is Indicated as.....		$ 50,000	$ 50,000

It is, of course, a fundamental principle that, in order to operate economically, and thereby be able to offer the greatest values to the public, factories should operate on as level a line

STANDARD TREND OF DOMESTIC CAR DELIVERIES TO CONSUMERS

MONTHLY PERCENTAGE DISTRIBUTION OF YEARLY VOLUME



of production as can reasonably be attained. Where there is a seasonal trend in the business, a level manufacturing curve means that finished product must be stored, a condition which is diametrically opposed to economical distribution, since the storing of the product produced in advance of consumers' requirements not only requires additional capital with its interest charge, but also expenses for insurance and other costs. There is also the danger, if sales do not come up to expectations, not only that the cost of carrying finished product may be unduly increased through prolonging the period of storage, but also that losses may result from the necessity of forced selling—i.e., distress merchandising of the excess stock at the end of the regular selling season.

As shown by the chart on page 418, there is a pronounced seasonal trend in the automobile business. It is the practice of the General Motors Corporation to adopt production schedules which are a compromise between economical manufacture requiring a level production, and economical distribution involving minimum stocks of finished products. The resultant production schedule is then one having seasonal characteristics, but without the radical changes indicated by the trend of sales to consumers. With such a production schedule, if total actual manufacturing expense is absorbed into actual costs each month, there would result variances in costs from month to month attributable to changes in rate of plant activity. Such cost figures are valueless for comparative purposes. They are also absolutely misleading as a guide in the determination of selling prices. For example, during a period of high volume, accounted costs would be low; while during periods of sub-normal volume, accounted costs would be high. It is, therefore, essential that there be a definite method established whereby the effects of fluctuating volume upon overhead costs may be eliminated. The method followed by the General Motors Corporation is to develop standard burden rates for each "burden center," so that there will be included in costs a reasonable average allowance for manufacturing expense, with the result that at no time is there any change in costs due to changes in the rate of operations.

Standard Volume. The words "there will be included in costs a reasonable average allowance for manufacturing expense" are easily spoken. "Try and do it," many of you will say. It is first necessary to obtain an expression of the estimated normal average rate of plant operation.

Rate of plant operation is affected by such factors as: general business conditions; the extent of seasonal fluctuation in sales likely within years of large volume; policy with respect to seasonal accumulation of finished and/or semi-finished product for the purpose of leveling the production curve; the necessity or desirability of maintaining excess plant capacity for emergency use; and many other factors. Each of these factors should be carefully considered by a manufacturer in the determination of size of a new plant to be constructed, and before making additions

to existing plants, in order that there may be a logical relationship between assumed normal average rate of plant operation and practical annual capacity. So far as practicable, the governing considerations should be applicable to the economic situation of the industry, rather than any abnormalities pertaining to a particular plant. The percentage accepted by General Motors Corporation as its policy in regard to the relationship between assumed normal rate of plant operation and practical annual capacity is referred to as standard volume.

Having determined the degree of variability of manufacturing expense, the estimated total expense at standard volume rate of operations can be established. A *standard burden rate* is then developed which represents the proper absorption of burden in costs at standard volume. In periods of low volume, the unabsorbed manufacturing expense is charged directly against profits as unabsorbed burden, while in periods of high volume, the overabsorbed manufacturing expense is credited to profits, as overabsorbed burden. By this generally accepted method, there is avoided the distortion of costs and inventory values which would result from spreading a fixed overhead over a fluctuating volume.

Commercial Expense. The usual practice of charging off commercial expenses from month to month eliminates the problem of overabsorption or underabsorption of expense made necessary in the case of manufacturing expense to avoid distortion to asset values in consequence of fluctuating volume. In the consideration of price to be established on the product, and in the preparation of estimated profit at various volumes, it is nevertheless important to analyze as to the variable and non-variable character of commercial expense and to determine the standard allowance for commercial expense. An analysis of commercial expenses along the lines suggested for manufacturing expenses can be made. Non-variable expense includes the principal administrative salaries, rents, etc. Salesmen's commissions typify 100 percent variable expense. Between these extremes comes the third class, expenses partially variable and partially non-variable, the amount of which increases or decreases with changes in volume, but not in direct proportion to those changes. This class includes such items as salesmen's and other salaries, traveling expense, etc., and the degree of variability can be determined for all practical purposes on the basis of past experience.

It is customary to allow for commercial expense as a given percentage of annual sales, and on this basis the *standard allowance* is the percentage which commercial expense constitutes of sales at standard volume rate of operations.

Return on Investment

So far we have dealt with factory costs and commercial expenses, which for the most part represent outlays by the manufacturer during the accounting period. An exception is depreciation of capital assets which have a greater length of life than the

accounting period. To allow for this element of cost, there is usually included an allowance for depreciation in the overhead or burden rates used in compiling costs. Before an enterprise can be considered successful and worthy of continuation or expansion, however, there is still another element of cost which must be reckoned with. This is the cost of capital, including an allowance for profit.

Whether a business is large or small, there is need of a policy in regard to the relation of capital investment to price of product, and the conditions under which additional capital is to be used to expand the business (either through retention of earnings instead of paying dividends, or from sale of capital securities.) The governing considerations are rate of return on investment and the relationship of capacity to average and peak demands. In a small business where ownership and management are identical, the fundamental policy may never be formally expressed, but it will nevertheless be taken into account by the owner-manager in making up his mind whether or not to make any additions to his plant. In the typical large industry, however, where capital is supplied by a large number of stockholders, many of whom are not active in the management, and particularly where the operations are diversified and scattered, it is essential that machinery be established by which the fundamental considerations of pricing of product and expansion programs can be related to the established policies.

In dealing with cost of capital, the standard specifications of the usual accounting dissertation call for an answer to the question, "Is interest an element of cost?" As a general rule, writers amuse themselves by a treatise on whether or not interest should be included in the accounted costs, a question of accounting technique which serves usually to befog the issue.

The true basis for measuring the commercial success of any enterprise from the financial standpoint is the return on the capital employed in the business; since the stockholders will not be satisfied if a corporation builds and sells a million cars a year merely for the edification and amusement of the manufacturing and engineering departments. The stockolders themselves must also get a run for their money, and are entitled to distributions of profits in the form of dividends, with dividend requirements covered by a generous margin in the form of capital reinvested in the business through earnings retained.

Certain of these articles entitled, "Is interest a cost?" recall to mind the story of the commuter who told how each morning he had noticed a little fox terrier rush down to the railroad station barking and running after the train as it pulled out. As the engine speeded up, the terrier would fall behind and soon be lost to sight. It had occurred to the commuter to wonder what the dog would do with the train should he chance to catch it.

Return on investment is the basis of the policy in regard to the pricing of product, but it must be understood that the funda-

mental consideration is the average return over a protracted period of time, not the specific rate of return over any particular year or short period of time. This long-time rate of return on investment represents the official viewpoint as to the highest average rate of return which can be expected consistent with a healthy growth of the business, and may be referred to as the *economic* return attainable. The adjudged necessary rate of return on capital will vary as between separate lines of industry, as a result of differences in their economic situation; and within each industry there will be important differences in return on capital resulting primarily from the relatively greater efficiency of certain producers.

As outlined earlier in this paper, the fundamental policy in regard to pricing of product and expansion of the business necessitates an official viewpoint as to the normal average rate of plant operation. This relationship between assumed normal average rate of operation and practical annual capacity has been referred to as *standard volume*, and controls the rate of absorption of burden into costs.

The fundamental price policy is completely expressed in the conception of *standard volume* and *economic return* attainable. For example, if it is the accepted policy that *standard volume* represents 80 percent of practical annual capacity, and that an average of 20 percent per annum must be earned on the operating capital, it becomes possible to determine the *standard price* of a product; that is, that price, which with plants operating at 80 percent of capacity, will produce an annual return of 20 percent on the investment.

The calculation of standard prices of products necessitates the establishment of standards of capital requirement as well as expense factors, representative of the normal average operating condition, in terms of their respective ratios to annual sales or annual factory cost of production, according to whichever is the more direct relationship. Attention is called to the fact that the word "standard" as used in this connection represents the estimated normal average condition, not the goal of efficiency toward which operations are directed. A brief description of the development of standards of capital requirement follows:

Standard Fixed Investment Factor. The standard allowance for fixed investment is readily obtained, once standard volume and standard cost have been determined.

Standard Factor for Fixed Investment

Investment in Plant and other Fixed Assets	$15,000,000
Practical Annual Capacity	50,000 units
Standard Volume, Percent of Practical Annual Capacity	80%
Standard Volume Equivalent	40,000 units
Factory Cost Per Unit at Standard Volume	$1,000

Annual Factory Cost of Production at Standard Volume $40,000,000
Standard Factor for Fixed Investment (Ratio of Investment to Annual Factory Cost of Production) . 0.375

Working Capital Proportionate to Volume. The amount tied up in working capital items should be directly proportionate to the volume of business. For example, raw materials on hand should be in direct proportion to the manufacturing requirements—so many days' supply of this material, so many days' supply of that material, and so on—depending upon the condition and location of sources of supply, transportation conditions, etc. Work in process should be in direct proportion to the requirements of finished production, since it is dependent upon the length of time required for the material to pass from the raw to the finished state, and the amount of labor and other charges to be absorbed in the process. Finished product should be in direct proportion to sales requirements. Accounts receivable should be in direct proportion to sales, being dependent upon terms of payment and efficiency of collections. An illustration of the method of the determination of standard price appears in the table below.

ILLUSTRATION OF METHOD OF DETERMINATION OF STANDARD PRICE

	Normal Average Requirements		Standards of Capital Requirement	
	In Relation to	Turnover Per Year	Ratio to Sales Annual Basis	Ratio to Factory Cost Annual Basis
Cash	Sales	20 times	0.050	-
Drafts and Accounts Receivable	Sales	10 times	0.100	-
Raw Material, and Work in Process	Factory Cost	6 times	-	0.16 2/3
Finished Product	Factory Cost	12 times	-	0.08 1/3
Gross Working Capital			0.150	0.250
Fixed Investment			-	0.375
Total Investment			0.150	0.625
Economic Return Attainable - 20 Per Cent			-	-
Multiplying the Investment Ratio by this, the Necessary Net Profit Margin is Arrived at			0.030	0.125
Standard Allowance for Commercial Expenses, 7 Per Cent			0.070	-
Gross Margin Over Factory Cost			0.100 (a)	0.125 (b)
Selling Price, as a Ratio to Factory Cost			= 1-b / 1-a = 1+0.125 / 1-0.100 = 1.250	
If Standard Cost				= $1.000
Then Standard Price = $1.000 x 1.250				= $1.250

There Is An Investment Center. Brief mention was made in an earlier part of this paper that continuous progress in scientific cost finding is being made through refinement in methods of distributing factory burden into costs, so as to reflect, as nearly as practicable, the actual expense involved departmentally, rather than to apply a general average burden rate to all departments. Proper distribution of burden departmentally is essential not only for the accurate costing of different products, but is also essential whenever there is occasion to compare the cost of manufacture of individual components or parts of a complete product with the prices at which similar units could be acquired elsewhere.

There is, however, an "Investment Center," just as truly as there is a burden center, and for industrial establishments manufacturing more than a single type of product, it will be found that responsibility for investment is not uniform. By giving fullest play to these differences in responsibility for investment, instead of averaging conditions, it will be found that the percentage which must be added to the total of manufacturing cost and commercial expense, in order to cover return on investment, varies widely as between different products.

In other words, there are different rates of capital turnover as applied to different products, and these varying rates of capital turnover should be an important factor in a consideration of prices to be established on different products. The importance of capital turnover is due to the fact that the annual capital turnover rate, multiplied by the profit margin percentage, determines the rate of return upon capital.

Responsibility for investment must be considered in calculating the standard price of each product as well as in calculating the over-all price for all products, since products with identical accounted costs may be responsible for investments which vary greatly. In the illustration given above, a uniform standard selling price of $1,250 was determined. Let us suppose, however, that this organization makes and sells two products, A and B, with equal manufacturing costs of $1,000 per unit, equal working capital requirements, and that 20,000 units of each product are produced. However, an analysis of fixed investment indicates that $10,000,000 is applicable to product A, while only $5,000,000 of fixed investment is applicable to product B. Each product must earn 20 percent on its investment in order to satisfy the standard condition. The table on page 425 will illustrate the determination of the standard price for product A and product B.

It is to be noted that the accounted costs of these two products are identical, and that the difference in their standard prices results solely from the fact that a larger fixed investment is required for product A. An illustration is the case of an automobile company manufacturing its own open bodies, but purchasing closed bodies. For open cars there is an investment in body manufacturing facilities on which a return should be earned, while closed cars require no body plan investment by this manufacturer. From

VARIANCES IN STANDARD PRICE DUE TO VARIANCES IN RATE OF CAPITAL TURNOVER

Standards of Capital Requirements

	Product A		Product B		Total Product (A plus B)	
	Ratio to Sales Annual Basis	Ratio to Factory Cost Annual Basis	Ratio to Sales Annual Basis	Ratio to Factory Cost Annual Basis	Ratio to Sales Annual Basis	Ratio to Factory Cost Annual Basis
Gross Working Capital	0.150	0.250	0.150	0.250	0.150	0.250
Fixed Investment	-	0.500	-	0.250	-	0.375
Total Investment	0.150	0.750	0.150	0.500	0.150	0.625
Economic Return Attainable - 20 Per Cent	-	-	-	-	-	-
Multiplying the Investment Ratio by this, the Necessary Net Profit Margin is Arrived at	0.030	0.150	0.030	0.100	0.030	0.125
Standard Allowance for Commercial Expenses, 7 Per Cent	0.070	-	0.070	-	0.070	-
Gross Margin Over Factory Cost	0.100 a	0.150 b	0.100 a	0.100 b	0.100 a	0.125 b
Selling Price, as a Ratio to Factory Cost $= \frac{1+b}{1-a}$	$\frac{1.+0.150}{1.-0.100} = 1.278$		$\frac{1.+0.100}{1.-0.100} = 1.222$		$\frac{1.+0.125}{1.-0.100} = 1.250$	
If Standard Cost equals		$1,000		$1,000		$1,000
Then Standard Price equals		$1,278		$1,222		$1,250

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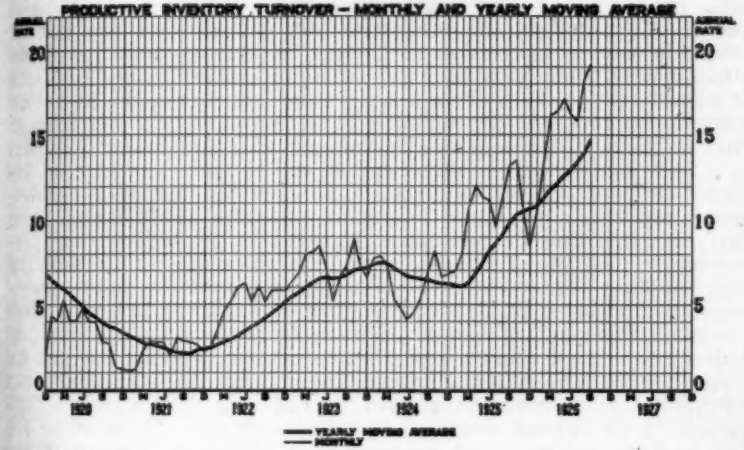
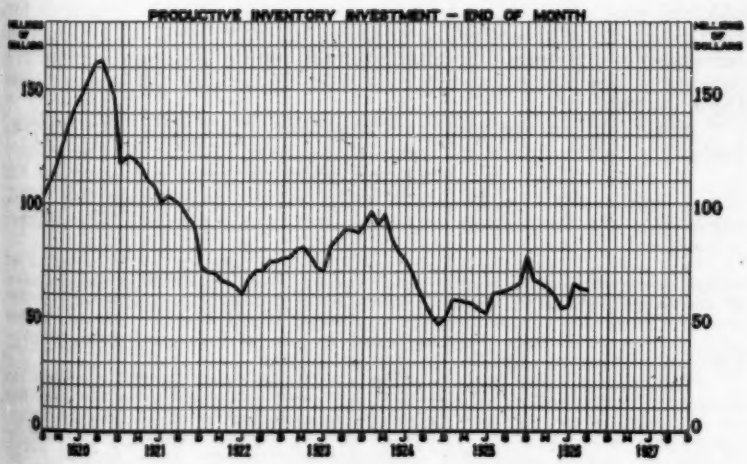
this analysis of investment, it becomes apparent that product A, which has the heavier fixed investment, should sell for $1,278, while product B should sell for only $1,222, in order to produce a return of 20 percent on the investment. Were both products

CHART 1.

GENERAL MOTORS CORPORATION

PRODUCTIVE INVENTORY





sold for the composite average standard price of $1,250, then product A would not be bearing its share of the investment burden, while product B would be correspondingly over-priced.

In this illustration we have considered only a variance in the fixed investment factor, although, for a purchased body as compared with a manufactured body there would also be differences in inventory requirements. Variances in working capital requirements as between different products may be even more marked, due to manufacturing methods, sales terms, merchandising policies, etc. Thus, to illustrate from the experience of General Motors Corporation, the inventory turnover rate of one line of products sold by a division of General Motors Corporation is six times a year, while inventory applicable to another line of products is turned over thirty times a year. In the latter case, the inventory investment required per dollar cost of sales is only one-fifth of that required in the case of the product with the slower turnover.

Just as there are differences in capital requirements as between different classes of product, so may the standard requirements for the same class of product require modification from time to time due to permanent changes in manufacturing processes, in location of sources of supply, more efficient scheduling and handling of materials, etc. Witness, for example, the improvement in Turnover of Productive Inventory (Total Inventory less Finished Product) of General Motors Corporation as a result of better control and more efficient manufacturing during the last six years. (See Chart No. 1, page 426.)* For the calendar year 1925 productive inventories were turned over 10.6 times, an increase of 50 percent over the best previous year 1923, while for the twelve months ended September 30, 1926, productive inventories were turned over 14.7 times. Stating this another way—in 1923 with an average productive inventory investment of $81,655,000, cost of production amounted to $581,588,000, whereas for the twelve months ended September 30, 1926, cost of production increased 62 percent to $944,315,000, while average productive inventory investment declined to $63,171,000, or 23 percent less than in 1923.

Similarly, in the best previous year, 1923, total inventories, including finished product, were turned over 4.74 times (See Chart No. 2, page 428).† In 1925 this showing was improved to 6.3 times, while for the twelve months ended September 30, 1926, there was a still further improvement to 8.0 times. The impor-

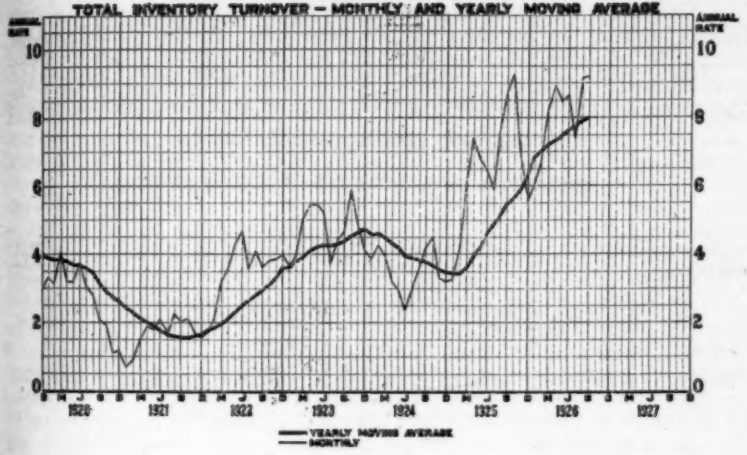
* Turnover of Productive Inventory—The rate of turnover for the month at an annual rate is obtained by relating productive inventory investment at the beginning of the month to cost of finished production for the month multiplied by twelve. The yearly moving average turnover is obtained by dividing the cost of finished production for the twelve months period by the average production inventory investment during the period.

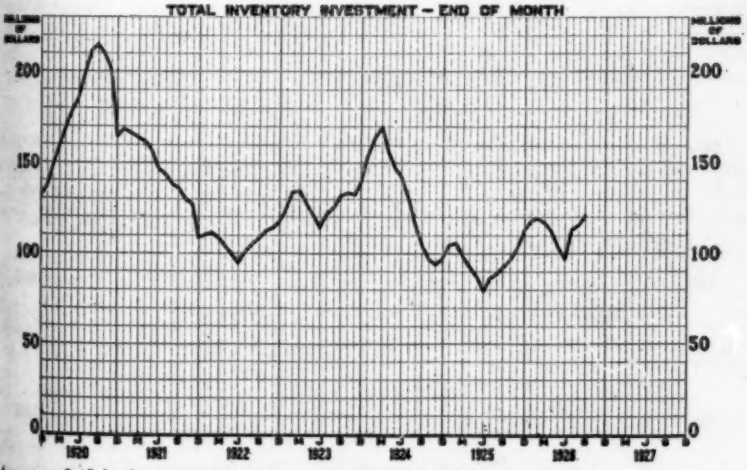
† Turnover of Total Inventory—The rate of turnover for the month at an annual rate is obtained by relating the total inventory investment at the beginning of the month to cost of sales for the month multiplied by twelve, after eliminating all inter-company sales. The yearly moving average turnover is obtained by dividing the cost of sales, after eliminating inter-company sales, for the twelve months period by the average total inventory investment during the period.

CHART - 2

GENERAL MOTORS CORPORATION

TOTAL INVENTORY





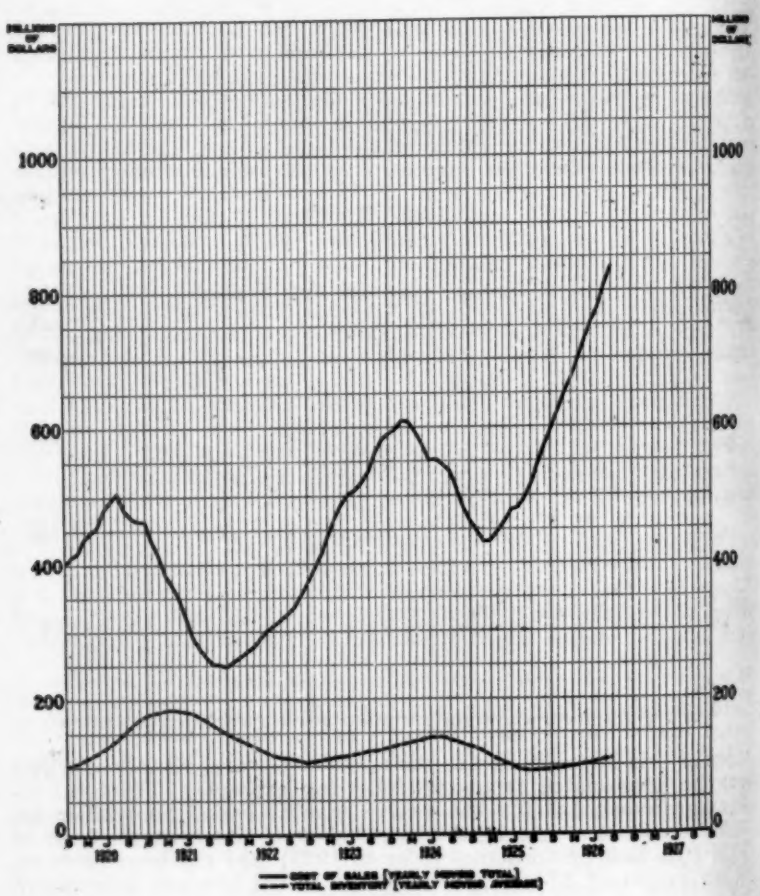
tance of this improvement to the buyer of General Motors products may be appreciated from the following example: The total inventory investment for the twelve months ended September 30, 1926, would have averaged $182,490,000 if the turnover rate of 1923 (the best performance prior to 1925) had not been bettered, or an excess of $74,367,000 over the actual average investment.

In other words, General Motors would have been compelled to charge $14,873,000 more for its product during this twelve months period than was actually charged if prices had been established to yield say 20 percent on the operating capital required.

The effect of the improvement in inventory turnover is shown in another manner on the chart on page 429. In the calendar year 1922 Cost of Sales amounted to $372,907,000 and the average Total Inventory Investment to $106,337,000. In 1926 with practically the same average Inventory Investment it was possible to handle

GENERAL MOTORS CORPORATION

COMPARISON OF TOTAL INVENTORIES AND COST OF SALES



a volume of business, represented by a Cost of Sales of $828,348.000.

Establishment of Capital and Expense Standards Means More Accurate Estimates. The analysis as to the degree of variability of manufacturing and commercial expenses with increases or decreases in volume of output, and the establishment of "standards" for the various investment items, makes it possible not only to develop "Standard Prices," but also to forecast, with much greater accuracy than otherwise would be possible, the capital requirements, profits, and return on capital at the different rates of operation which may result from seasonal conditions or from changes in the general business situation. Moreover, whenever it is necessary to calculate in advance the final effect on net profits of proposed increases or decreases in price, with their resulting changes in volume of output, consideration of the real economics of the situation is facilitated by the availability of reliable basic data. For example, it may be desired to calculate the additional volume of business required to offset a contemplated reduction of five percent (5%) in price of product, without decreasing total net profits. For the typical automobile manufacturing establishment, an analysis of the fixed expense and profit position indicates that an increase of 34.28 percent in volume of business is required in order to offset a price reduction of five percent without the impairment of total profit, assuming that the necessary capacity is available. If the 34 percent increase in volume should necessitate additions to plant, or working capital in excess of normal average requirements, then an increase in volume in excess of 34 percent would be required in order to provide, after a five percent price reduction, a return on the additional capital employed and to maintain profits at the original level.

CASE I.

ADDITIONAL SALES VOLUME REQUIRED AFTER 5% REDUCTION IN LIST PRICE IN ORDER TO YIELD SAME TOTAL AMOUNT OF NET PROFIT AS EXISTED ON ORIGINAL VOLUME BEFORE PRICE REDUCTION

	Total (a)	Per Unit (b)
1. *Volume Basis*	*66,400*	
2. Sales at Present Prices	$50,080,098	$754.22
3. Sales after 5% Reduction in Price	47,576,093	716.51
4. Net Profit at Present Prices	5,100,467	76.81
5. Net Profit after 5% Reduction, present volume	2,596,462	39.10
6. Difference representing additional net profit required through added volume (Item 4—Item 5)	2,504,005	

CALCULATION OF ADDITIONAL NET PROFIT RESULTING FROM ADDED VOLUME

7. Fixed Manufacturing Expense	$ 2,599,500	$ 39.15
8. Fixed Commercial Expense	2,108,033	31.75

9.	Net Profit after 5% Reduction in (list) Price (Item 5b).....	2,596,462	39.10
10.	Additional profit resulting from each car of added volume.....		$110.00
11.	Additional Volume Required to offset price reduction (Item 6 ÷ Item 10)	22,764 Cars	
11a.	Additional Volume as percent of present volume (Item 1).....	34.28%	

CASE II.

DECREASE IN SALES VOLUME PERMISSIBLE AT PRESENT PRICE BEFORE TOTAL NET PROFITS ARE REDUCED TO AN AMOUNT EQUIVALENT TO TOTAL NET PROFITS AT PRESENT VOLUME AFTER A 5% REDUCTION IN PRICE.

12.	Reduction in net profits with 5% reduction in list and no change in volume (Item 6 above).....	$ 2,504,005

CALCULATION OF DECREASE IN PROFITS RESULTING FROM REDUCTION IN VOLUME

13.	Fixed Manufacturing Expense....	$ 2,599,500	$ 39.15
14.	Fixed Commercial Expense.....	2,108,033	31.75
15.	Net Profit at present price (Item 4)	5,100,467	76.81
16.	Decrease in Profits resulting from each car of reduced volume....		$147.71
17.	Decrease in Sales Volume Permissible (Item 12 ÷ Item 16).....	16,952 Cars	
18.	Percent Decrease in Sales Volume Permissible (Item 17 ÷ Item 1)..	25.53%	
Note:	To offset each 1% Reduction in Price the Volume at present price can be reduced.....	5.10%	

Similarly, this analysis indicates that a decline of 25.53 percent in volume of business at present prices can be suffered before profits are reduced to a figure as low as they would be if present volume were sustained at the expense of a five percent reduction in prices.

It is believed that these figures are typical of the automobile industry today, and they are of unusual significance. Perhaps the outstanding economic achievement of the automobile manufacturer during the last twenty years has been his ability to cut costs, and to widen his market through reduced selling prices. Successful companies have been able to increase total profits as a result of the much larger volume sold at lower prices, and no theory could have been more sound throughout the period of rapid growth of the industry. How rapid that growth has been is indicated by the following table:

Annual Production of Motor Vehicles

Total Cars and Trucks

Year	Number	Year	Number
*1899	4,192	1915	892,618
1903	11,000	1916	1,617,708
*1904	22,830	†1917	1,868,949
1905	25,000	†1918	1,153,638
1906	34,000	1919	1,974,016
1907	44,000	‡1920	2,205,197
1908	65,000	‡1921	1,661,550
*1909	130,986	‡1922	2,659,064
1910	187,000	1923	4,095,000
1911	210,000	1924	3,640,000
1912	378,000	1925	4,336,000
1913	485,000	§1926	4,600,000
*1914	569,054		

Only ten years ago, in 1916, annual production first exceeded a million cars and trucks. Four years later this record had been doubled, for the year 1920 saw the production of 2,205,197 cars and trucks. Within the short space of three years, the record had again been doubled, for production in 1923 exceeded 4,000,000 vehicles. For the four-year period 1923-1926 inclusive (with the last quarter of 1926 estimated) annual production has *averaged* about 4,100,000 cars and trucks. The poorest of these four years, 1924, fell below the average only ten percent. The indication for 1926 is a new record of about 4,600,000 vehicles, but this record is not more than 12 percent above the four-year average. It seems evident, therefore, that the automotive industry cannot expect in the future the tremendous annual rates of increase realized in the years prior to 1924. The expectation is rather that of a healthy growth in line with the increase in population and wealth of the country, and the further development of the export market.

There is a vital message in these figures showing that the present economic position of the typical automobile manufacturer requires an increase of 34 percent in sales volume to offset a modest price reduction of 5 percent, whereas no such increase as 34 percent is possible for the industry. It is possible, although not at all likely, that a small manufacturer, say with an annual volume of 6,640 cars, might be able to gain an added volume of 34 percent or 2,276 cars as a result of a price reduction of 5 percent, and thereby not suffer an actual reduction in aggregate profits. It seems extremely doubtful, however, that even a 5 percent reduction in price of itself would prove a sufficient stimulus to attract 34 percent more business. A 5 percent price reduction

*From U. S. Census reports. 1899 for fiscal year ended June 30, 1900.

†Production figures compiled by Automotive Products Section, War Industries Board, from sworn statements by manufacturers.

‡Figures include production of plants located in Canada, making motor vehicles of U. S. design.

§Estimated, based on 9 months production of 3,675,692.

by the manufacturer would reduce the delivered price of the average car only about $45, or 4.6 percent of the average delivered price of $970. The percentage reduction in delivered price is less than the percentage reduction by the manufacturer by reason of the fact that he cannot reduce the freight delivery cost. For a manufacturer with an annual production of 66,400 cars, the required 34 percent increase in volume would be 22,764 cars, a tremendous gain. For the industry as a whole, the necessary annual increase of 34 percent, or approximately 1,400,000 cars a year, would be entirely out of the question. Apparently, therefore, we have reached or are fast approaching the point for the industry where lowered prices cannot attract business in volume sufficient to compensate for the reduced profit margin per car.

SUMMARY

To recapitulate: The fundamental price policy of a corporation, once formulated, is completely expressed in the conception of *standard volume* (relationship of estimated long-time average rate of plant operation to practical annual capacity, which rate of operation controls the absorption of burden into costs) and expected long-time average rate of return on investment. An analysis of investment along lines of responsibility, together with accounted costs, makes it possible to establish standard cost and capital factors which in turn permit the expression of the fundamental policy in terms of price of product, i.e., standard price. While prices cannot be established on the basis of any formula alone, and no definite rule for establishing prices can be ridigly adhered to, the determination of standard prices affords a means of gauging proposed and actual prices, profits and return on capital in terms of the fundamental price policy, and the extent of necessary departures due to competition and other practical considerations; and submits the policy itself to the test of experience.

The development of industry usually is accompanied by an increase in fixed investment, which results from the further adaptation of labor-saving machinery, and from the tendency of the industrial unit to become a more complete manufacturer. Total cost may decrease, but the proportion of selling price necessary to cover indirect expense and return on investment tends to increase. The problem of equitably distributing over different products both indirect costs and the profit margin necessary to provide return on the capital employed is, therefore, one of increasing importance, and its solution is facilitated by the periodic development of standard prices, based upon standards of capital requirement and of manufacturing and commercial expense.

Stability of prices is a condition under which industry prospers. The cost accountant is in a position to present information that is an essential part of an appraisal of the real economic situation of his own company, and thereby to act as a safeguard against action fundamentally unsound. In proportion to the accomplishment of this purpose will the cost accountant contribute to intelligent competition and consequent stability within his own industry, a condition which will contribute toward improvement in the economic well-being of the country.